MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, **2019/2020**

HPB 2021 – BIOINFORMATICS PROGRAMMING II

(All sections / Groups)

18 OCTOBER 2019
9:00 AM-11:00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 4 pages including cover page.
2. Attempt all **FOUR** questions. All questions carry equal. Marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 – [10 MARKS]

What is the output of the following codes? [10 marks]

i) [0.75 mark]

```
x = 3
if 2 > x :
   print 'First'
else :
   print  'Second'
   if 2 > x :
      print 'Third'
   print 'Fourth'
print 'Fifth'
```

ii) [2 mark]

```
words = 'this IS NoT oDD'
print words.title()
print words.replace("IS", 'was')
print words.upper()
print words * 2
```

iii) [0.75 mark]

```
a = True
b = False
c = False

if not a or b:
   print 1
elif not a or not b and c:
   print 2
elif not a or b or not b and a:
   print 3
else:
   print 4
```

iv) [1 mark]

```
D = {1 : 1, 2 : '2', '1' : 1, '2' : 3}
D['1'] = 2
print(D[D[D[str(D[1])]]])
```

a) 2
b) 3
c) '2'
d) KeyError

v) [1 mark]

```
for y in range(100, 95, -1):
   if y != 25:
         print y,
```

vi) [1 mark]

```
D = dict()
for i in range (3):
   for j in range(2):
      D[i] = j
print(D)
```

a) {0: 0, 1: 0, 2: 0}
b) {0: 1, 1: 1, 2: 1}
c) {0: 0, 1: 0, 2: 0, 0: 1, 1: 1, 2: 1}
d) TypeError: Immutable object

vii) [0.5 mark]

```
def what(n):
   if n == 0:
      return 0
   else:
      return n + what(n-1)
print what(5)
```

viii) [1 mark]

```
punctuations = '''!()-
[]{};:'"\,<>./?@#$%^&*_~'''

my_str = input("Enter a string: ")
new_str = ""
for char in my_str:
  if char not in punctuations:
     new_str = new_str + char
print new_str
```

>>>Enter a string: ("Hello!!!", he said ---& he went.)

ix) [1 mark]

```
my_tuple = (1, 2, 3, 4)
my_tuple.append( (5, 6, 7) )
print len(my_tuple)
```

x) [1 mark]

```
class Acc:
   def __init__(self, id):
      self.id = id
      id = 555

acc = Acc(111)
print acc.id
```

a. 111
b. 555
c. error

QUESTION 2 – [10 MARKS]

a) Given a string S as below:

```
>>> S = "AAL532906 aaaatagtcaaatatatcccaattcagtatgcgctgagta"
```

i. Write Python code to search for r1 = "AGT" (uppercase) in S. If it is present, print "found", otherwise print "not found" [2 marks]

ii. Write Python code to find and print the starting index (location) of r1 in S. If there is more than one, print all of them. [2 marks]

iii. Write Python code to get and print the substring of S between 2 occurrences of r1. [1 mark]

Continued...

b) Write a function which will calculate the AT percentage of a DNA sequence. If the name of the function is given as **at()**, it returns the following at the python interpreter: [2 marks]

```
>>> at('cgtgccgtcgcg')
16.666666666666667
```

c) Create a class named Sequence, use the __init__() function to assign values for seq and length. Create an object afterwards and print the objects data members' values. [3marks]

QUESTION 3 – [10 MARKS]

a) Read all the sequences in a FASTA formatted file "example.fa" using BioPython. Display the longest sequence, ID of the sequence and the length. [5 marks]

b) Write BioPython code to translate vertebrate mitochondria sequence. The code should:

i. Accept user input
ii. Create a Seq object using the IUPAC.unambiguous_dna alphabet
iii. Translate the sequence [5 marks]

QUESTION 4 – [10 MARKS]

a) What is the difference between array and matrix? [1 mark]

b) Given x <- matrix (c (4, 5, -5, 1, 8, 3), nrow = 3 , byrow = T) and y <- matrix (c (2, -3, 5, -1) ,nrow = 2, byrow = T) write the output when: [4 marks]

i. >x
ii. >y
iii.> x%*%y

c) Write an R code to receive a ";" delimited csv file from user and plot a graph by using *qplot* function. *qplot* is a function in the *ggplot2* package. Prior calling the *qplot*, install and import the package *ggplot2*. [5 marks]

End of Paper